

Chapter 7: Organization And Technology Of Gambling

Most research on the causes of pathological gambling examines gamblers themselves--their family backgrounds, personality traits, experiences with gambling, attitudes about risk, motivations to gamble, and genetic attributes. Such research can lead to a better understanding of individual risk factors in pathological gambling and to better ways to predict and treat gambling problems. Another perspective examines changes in the social and technological environment surrounding gambling. From this perspective, we can ask whether changes in the organization of the gambling enterprise and technologies of gambling lead to more or fewer pathological or problem gamblers, or to new disorders associated with gambling. These are critical questions for developing sensible policies.

Most of the research on these questions is only indirectly related to pathological gambling. At the level of games and betting, there is considerable experimental research on the effects of game structure and game presentation on people's propensity to take risks or to make "nonrational" gambles (e.g., Cole and Hastie, 1978; Mikesell and Zorn, 1987; Ladouceur and Gaboury, 1988). Papers have been authored about how, at the level of society, legalization has potentially affected the prevalence of gambling and pathological gambling (Rose, 1995, 1998). There also has been discussion, but not much empirical research, on how changes in the gambling industry have changed the social context of gambling (e.g., Clotfelter and Cook, 1989). More recently, researchers and policymakers are debating whether the spread of computer-based (video or machine) gambling is changing the prevalence or nature of pathological gambling (Fisher, 1994; Fisher and Griffiths, 1995). Research has not established whether distinctive types of gambling organization and technology cause systematic changes in pathological gambling, but some of the research suggests such links may exist (Griffiths, 1993, 1995, 1998).

HISTORY

Much of what we know about the effects of earlier changes in the gambling industry and gambling technologies--such as the introduction of slot machines and the legalization of casinos in Nevada--comes from historical, biographical, and ethnographic narratives (e.g., Chavetz and Simon, 1967; Skolnick, 1978; Thompson, 1986; Fabian, 1990). This work suggests a close relationship between the social context and technology of gambling, gambling behavior, and social outcomes. For example, according to Barrett (personal communication to the committee, 1998), the most significant early technological development in horse racing was the invention at the turn of the century of a wagering system and calculating machine called the Pari Mutuel System. (The system survives today as "pari-mutuels".) The system allowed some bettors to improve their outcomes by predicting races more skillfully and/or by betting more wisely than most bettors, who underestimate the utility of betting on favorites compared with long shots (Griffiths, 1994; Metzger, 1985; Ladouceur et al., 1998). The system also gave rise to distinctive social roles (bookmaker, professional racetrack gambler, punter) and distinctive supporting technologies (e.g., the racing form).

Different domains of gambling have evolved distinctive cultures, norms, technologies, and social groups who have dominated gambling markets in their respective domains. For example, bingo has its callers and parlors and mainly women patrons. In general, "female" gambling domains are those in which gambling is likely to be less skill-based or to involve less social assertiveness than "male" domains (Kiesler et al., 1985). Kallick and colleagues (1979) noted that, in the United States, Jewish men were overrepresented at the racetracks and were also

likely to have gambling problems. This demographic pattern, which is not as discernible in current studies, perhaps was related to the proximity of racetracks to Jewish communities. In any event, there developed among these men a subculture of the track and racing lore. Close social networks were formed among those who bet at the track or in offtrack venues; they would trade tips and loans. Rosecrance (1986) and Zurcher (1970) have also provided accounts of the role of social groups in gambling. It is possible that the subculture of some gambling domains buffers the effects of pathological and problem gambling. For example, friends who gamble together may exert mutual social pressure to limit their gambling expenditures. Such social processes surrounding the technology of gambling have obvious implications for the advent of home gambling and machine games that may also encourage solo gambling.

NATURE AND STRUCTURE OF GAMES

A large body of research suggests that today's gambling technologies and venues take advantage of people's normal responses to reward contingencies and to people's cognitive biases, perceptions of risk, and tendency to compartmentalize mental accounts of their expenditures (e.g., Fischhoff et al., 1981; Wagenaar, 1988; Varey et al., 1990; Kahneman and Tversky, 1979; Tversky and Kahneman, 1992). Some economists argue that gambling represents the purchase of an intangible leisure good, like purchasing a ticket to the movies (Christiansen, 1998). However, because gamblers no doubt expect, or hope for, something tangible (money), gambling might be less similar to viewing a movie than to shopping for a luxury watch or car. The value of the activity draws in part from the social desirability of obtaining a rare tangible good and in part from the drama or pleasure of the activity itself. Risk may be part of the pleasure. Gambling is influenced both by the actual risks and rewards of games and by how people imagine these risks and rewards.

Reward Contingencies

Most of the early experimental literature related to gambling focused on the tangible rewards in gambling and were derived from studies of learning through reinforcement and conditioning. Animal and human studies showed that behavior that is rewarded intermittently and randomly is likely to be repeated in the same situation and will be highly resistant to extinction (i.e., the behavior ceases only after many unrewarded trials). Thus, variable and multiple rewards in a gambling situation evoke more gambles and higher bets than single, consistent rewards do (Knapp, 1976). Because most commercial games comprise intermittent rewards of varying magnitude, early learning research suggested that what it called compulsive gambling is a learned or conditioned behavior; however, since few gamblers become compulsive, intermittent and variable reward alone cannot explain problem or pathological gambling.

One possibility is that additional aspects of gambling reward experiences are likely to result in habitual or problem gambling. For instance, people are likely to continue gambling when they are ahead and can gamble "with the house's money" (Thaler and Johnson, 1990). As mentioned in Chapter 2, it has also been shown that near-wins (e.g., the slot machine shows two apples and one pear) are particularly motivating (Skinner, 1953) (see also Kahneman and Tversky, 1979, for cognitive explanations of this effect). With some exceptions (e.g., Ladouceur et al., 1995), this research has been conducted in hypothetical gambling situations or involved

small amounts of money (e.g., Wagenaar, 1988). A few studies report that pathological gamblers say they experienced a jackpot or winning streak early on (e.g., Moran, 1970), which is consistent with the laboratory research, although these studies lack baseline data. Perhaps every gambler remembers his or her first big win.

Cognitive Distortions

Research on the cognitive processes involved in judgment and choice has been fruitful in helping to elucidate gambling choices and preferences and, by extension, the kinds of technologies that may encourage habitual or excessive gambling (Wagenaar, 1988). For example, several specific cognitive distortions have been noted as possible contributors to pathological and problem gambling, including: (1) the misunderstanding of the concepts of chance and randomness, (2) attitudinal and belief inertia, and (3) improper resetting of mental accounts. Each of these, discussed below, may contribute to biases in people's assessment of chance processes. Not surprisingly, many popular and profitable gambling products feature games that capitalize on biased judgments; many of these products are attractive to people even in the presence of very unlikely rewards. For example, many gamblers seem to think that multiple gambles give them "more ways to win" even when the multiple gambles are actually disadvantageous to them (Cohen and Chesnick, 1970). And many gamblers also believe independent, random events are somehow connected (Ladouceur and Dube, 1997).

People generally have a strong need to impose order or meaning on random processes, and researchers have investigated whether people can generate random sequences of binary events (such as flipping a coin). Results show that they are often poor at both recognizing and creating such sequences (Wagenaar, 1988), may impose too many alternations on a sequence, or may equate randomness with a balance of event frequencies (Wagenaar, 1972). These tendencies contribute to the gambler's fallacy, which dictates that past losing events are less likely to occur in the future (Clotfelter and Cook, 1993). For example, after several heads have appeared sequentially in the tossing of a coin, it is hard for many to resist the temptation to believe that the next toss will not be heads once again, even though the odds are still 50 percent heads versus 50 percent tails.

In addition to trying to identify predictable patterns in random sequences, people also try to control random outcomes. Langer (1975) refers to this effect as the illusion of control. Gamblers have a variety of methods for exerting their control in gambling situations. For example, Henslin (1967) noted that some gamblers believe they can influence the outcomes of a die roll by tossing it softly for a low number and hard when a high number is desired. Keren and Wagenaar (1985) found that blackjack players would often switch to new tables after a streak of losses in order to change their luck. Other blackjack players would try to *interfere* with the shuffled order of cards by drawing an extra card that they would normally never draw. In this way, they believed they could break an unlucky predetermined pattern and put themselves on a winning streak.

The attempt to impose order on random sequences also relates to overestimating the importance of minimal skill involved in some types of gambling. This was described by Gilovich et al. (1985) and Tversky and Gilovich (1989) who claim that the "hot hand," apparent in basketball when a player's performance is perceived to be significantly better than expected, may be no more than a long sequence of randomly generated events. That is, players occasionally may perform better than expected simply due to chance, and to believe otherwise

may be a cognitive distortion. However, playing basketball involves skill. So, although a successful string of free throws may be the result of chance, it is also possible that a player's shooting on a particular day may have been much more skillful than normal and due to little if any chance at all. As previously indicated, some forms of gambling (e.g., cards and track betting) involve both chance and limited skill. Cognitive distortions can occur when gamblers over- or underestimate the chance and the skill involved.

Other forms of gambling, such as slot machines, involve no skill at all but can nonetheless affect illusions of control. Griffiths (1994) asked those who gambled frequently and infrequently, "Is there any skill involved in playing the slot machine?" Those who gambled infrequently tended to say, "mostly chance," whereas frequent gamblers often said, "equal chance and skill." When asked, "How skillful do you think you are compared with the average person?" frequent gamblers thought they were often above average in skill, whereas infrequent gamblers said they were either below average or totally unskilled.

Gamblers favor lotteries featuring complex games; they fail to multiply probabilities and believe they are more likely to win these games than they really are (Cole and Hastie, 1978). These perceptions may explain some of the attractions of slots, lotteries, and multiple-game video machines. Gamblers also favor long shots (Griffith, 1994; Metzger, 1985), a bias that causes them to win less than they might otherwise in sports betting. Experience does not necessarily increase accuracy. With experience, many gamblers lose their fear of taking risks, place larger bets, and bet more on long shots (Ladouceur and Mayrand, 1986).

Gamblers' reduced fear with experience may be associated with their tendency to create stories about events and anthropomorphize gambling objects. Gamblers imbue artifacts such as dice, roulette wheels, and slot machines with character, calling out bets as though these random (or uncontrollable) generators have a memory or can be influenced (Langer, 1975). More generally, gamblers desire, and think they can have, more influence than they actually do on random events (Langer, 1975). They choose lucky numbers, get strong hunches about future random events, value numbers they choose more than numbers they don't, think they can influence a dealer's shuffle, and bet more on their own hands than on others' hands (Phillips and Amrhein, 1989; Chau and Phillips, 1995; Lacey and Pate, 1960). They develop retrospective stories about systematic turns of luck, resulting in the gambler's fallacy about past losses (Rule and Fischer, 1970) and a belief in winning streaks (Myers and Fort, 1963; Cohen et al., 1969). They also remember wins and explain away losses (Gilovich, 1983) and become more comfortable with risk and what they are "learning" as they make repeated gambles (Rachlin, 1989). The illusion of luck turning or of control increasing with experience encourages betting (Lupfer and Jones, 1971). Rachlin (1990) suggests that gamblers frame their games in strings, ending each string after a win. He claims people are especially attracted to large prizes because any win would more than eliminate losses.

Pathological gambling often involves chasing losses (Lesieur, 1984). This behavior is addressed by Rachlin (1990), who argues that people who persist in gambling despite heavy losses do not adequately update their mental accounts. Normally, people keep track of their spending, winnings, and cash amounts mentally. Thayer (1996) explains that they may have different risk attitudes toward money spent on entertainment, vacations, college, and food and claims that dollars in different accounts may not be exchangeable. Rachlin (1990) describes how gamblers may not reset their mental accounts often enough to recognize the full extent of their losses; that heavy gamblers temporarily discount losses more in long, negative strings than in short, positive strings. Negative strings can be evaluated positively in the mind of the gambler

if losses are discounted. Furthermore, gamblers postpone their resetting as they continue to gamble, which can make negative strings falsely appear even more positive. This model of chasing losses can describe at least some of the cognitive distortion in pathological gambling.

Moreover, peoples' attitudes, beliefs, and opinions are remarkably resistant to change, even when confronted with overwhelming evidence to the contrary (Klayman, 1987). This state of attitudinal and belief inertia is exacerbated by biased memories of past events. Some theorists have argued that people show evidence of a hindsight bias (Fischhoff, 1975). After an outcome has occurred, people may claim that they "knew it all along" (Wagenaar, 1988)--which may illustrate another form of omnipotence or an illusion of control. In addition, gamblers may have better recall for absolute wins than for relative net winnings--because they gamble frequently, they may win frequently, and some of their wins may be quite large. Nonetheless, those who gamble also lose frequently, and given the fact that the odds are against them, losses usually surpass wins by a considerable margin. Yet it is the wins, especially the big wins, that tend to be remembered, and losses tend to be discounted or forgotten.

An important question is whether electronic slots, video poker, and video lottery machines, all of which are spreading rapidly and involve chance-based betting, are more or less harmful than more traditional games, such as racetrack betting and playing poker and blackjack. There are arguments on both sides of this question, and empirical research has not settled the matter. In part the question depends on who gambles. Games that are part skill-based might attract particular groups, such as men (Chantal et al., 1995; Oster and Knapp, 1998), educated people, or people who desire control (Langer, 1975; Chantal et al., 1995); such groups may be more or less prone to pathological gambling. On one hand, problem gambling could result from skill-based betting per se, if people's belief in their gambling skills encouraged them to hold misplaced illusions of control or respond overly to short-term streaks (Phillips and Amrhein, 1989). On the other hand, skill-based gambling might be less likely to lead to pathological gambling than wagering in purely chance games. If wagering involves skill, then negative feedback (losses) could cause further study or rational adjustments in strategy. Game speed may be important. Skill-based betting may be experienced as slow or unexciting compared with most chance betting situations (Barrett, 1998). Although the absence of time pressure tends to encourage betting in the laboratory (Phillips and Amrhein, 1989), gambling without time pressures in real-world settings could be experienced as relaxing and might encourage gamblers to bet limited amounts to extend their play time.

Game Structure

The characteristics of game technologies, such as the number of gambles offered per time period, the physical and informational environment of games, game rules, speed of play, probabilistic structure, cost per play, and jackpot size, appear to affect gambling preferences and habits. For instance, repetitive and multiple interactive games can be created in which the gambler's illusions of increasing skill and premonitions of impending luck are encouraged through reward contingencies. These technology attributes, of course, are more easily manipulated by those who develop and offer games than are attributes of gamblers themselves. New computer-based video machines, in particular, can be programmed to emit the most empirically profitable stimuli and reward contingencies. Often today's machines and games are tested with customers in real gambling settings; those that pay off best are retained and those that customers tire of are discarded (McKay, personal communication to the committee, 1998).

Hence these products adapt to the marketplace, evolving to present more enticing gambling situations.

State lottery commissions have increasingly changed the structure of lotteries to take advantage of cognitive biases and responses to reward. A powerful phenomenon is people's attraction to bets featuring large rewards with small probabilities of winning as opposed to bets with smaller rewards and bigger probabilities of winning (Herrnstein, 1990). In the 1990s, numerous front-page stories documented public zeal over multimillion-dollar jackpots with infinitesimal chances of winning. Cook and Clotfelter (1993) provided a thorough account, both theoretical and empirical, of the effect of odds and jackpots on lotto play. They note that the size of the market may influence lotto ticket sales and determine whether a long-odds game is feasible to implement in states like Delaware with relatively small populations. Lyons and Ghezzi's (1995) time series analysis of Oregon's and Arizona's lotteries is one of the few quasi-experimental studies showing how these preferences interact with changes in technology. The authors showed that Oregon's lottery was modified five times and Arizona's four times from 1985 to 1991. Each modification resulted in lower odds of winning and/or a bigger jackpot. On one hand, reducing the odds was unrelated in either state to changes in betting, suggesting that people like low stakes and do not discriminate different odds or changes in the odds when the odds are small anyway (see also Waerneryd, 1996; Huber et al., 1997). On the other hand, increasing the jackpot was strongly related to increased betting. Betting also increased when lotteries were drawn twice weekly instead of weekly, which could be explained either by increased opportunity to play or by reduced risk aversion with more familiarity (Rachlin, 1989). Sales trends suggested that ever-larger jackpots were required to sustain previous levels of play.

Lyons and Ghezzi's (1995) time series study strongly suggests that gambling can be manipulated by lottery organizations through adjustments of lottery structure and rewards. However their study did not examine all aspects of the game environment. For instance, Oregon has added instant scratch-off numbers games, keno, video poker, sports betting, and the multistate Lotto American game. Both states border Nevada and California, which offer competing products. The behavior of the Oregon and Arizona lottery commissions suggests strongly that lottery organizations model one another in devising competitive market strategies; hence changes in the environment of gambling arise from interstate as well as intrastate competition. Advances in telecommunications and the spread of Internet-supported gambling suggest that gambling is becoming a global business, responsive to competitive pressures across the world.

"Stimulus" Context of Games

A dimension of games that has not received much research attention is the physical and informational environment in which games are presented. This environment includes such factors as informational variations in advertising and instructions, visual differences in the architecture of casinos, and what interface designers call the "form factor" of games (e.g., whether the slot machine has an arm or buttons, takes coins or reads plastic cards, and so forth). Advertising and other information affect what people know about gambling and how they think about it. For instance, lottery organizations publicize winners of big jackpots and use slogans that emphasize the pleasures of playing and winning (see Michael, 1993). Casinos design their architecture to make customers feel as though they are visiting a fantastic, but legitimate world

(along the lines of Disneyland); rooms, lighting, sound, and the array of game areas are meant to create feelings of welcome, excitement, comfort, and luxury (Skea, 1995; Kranes, 1995).

Research on working memory and the consequences of cognitive load suggest that gambling situations with many distractions cause changes in how people make decisions and judgments. Generally, this research shows that multiple conflicting stimuli, multiple calls on attention, and noisy environments cause increases in cognitive load (effort of processing information and using working memory), which in turn cause people to process information using guesses and stereotypes and to respond more automatically to stimuli (Gopher and Donchin, 1986). Casinos, racetracks, and increasingly lines at multistate lottery venues feature crowds and crowd suspense and a celebratory atmosphere. Casinos have large rooms, lines of noisy machines, the sound of coins spilling into trays, flashing neon lights, multimedia presentations, loud announcements over the sound system, and the smells of food, perfume, and alcohol (Skea, 1995; Hirsch, 1995). This barrage of distracting stimuli is likely to induce high levels of cognitive load, which in turn could reduce introspection, increase the use of guessing in gambles, and more generally encourage thoughtless gambling.

LEGALIZATION AND SOCIAL INFLUENCE

Legalization is assumed to dramatically change the organization and technology of gambling as new businesses enter the market. In the past few decades, researchers have examined the effects of changes in the legal status of gambling. In particular, the entry of legal gambling enterprises into a locale creates many new opportunities for the public to gamble easily and without stigma. Researchers interested in legalization have emphasized how legalization may have increased people's access to gambling by giving them closer proximity to gambling establishments and making gambling products and services more available.

It is not known whether increased access changes fundamental gambling patterns or switches gamblers from one venue to another. Hybels (1979) argued that related types of gambling (e.g., wagering related to horse racing) may be complementary, that is, when a new kind of gambling is introduced in a particular gambling domain, people gamble more. Lesieur and Sheley (1987) noted that illegal and legal gambling can cooccur; they describe "line sellers," who sell (illegal) tickets on the basis of the display board at legal bingo games. There is conflicting evidence on whether new games displace other gambling or augment total gambling. Kaplan (1990) argues that the decline in racetrack attendance preceded the establishment of state lotteries and that racetrack attendance doesn't differ much between lottery and nonlottery states. However, Coate and Ross (1974) and McDonald (1976) reported that the opening of offtrack betting venues in New York City hurt racetrack attendance. Thalheimer and Ali (1992) found that opening a telephone betting service reduced racetrack attendance and betting overall. This evidence points to a tentative conclusion that, once people have had access to many gambling options, their gambling expenditures level off and are relatively fixed.

Legalization has been linked to pathological gambling. Volberg (1994) reported that the percentage of pathological gamblers as a percentage of the total population was less than 0.5 percent of the population in states where gambling had been legal for less than 10 years, whereas it was 1.5 percent in states where gambling had been legal for more than 20 years. Two prevalence studies reviewed by the committee show increases in the number of pathological gambling before and after legalized gambling (Cox et al., 1997; Emerson and Laundergan,

1996). However, some studies have failed to show that legalization results in increased pathological or problem gambling (Jacobs, personal communication to the committee, 1998). Hraba and colleagues (1990) found that participation in a state lottery was associated with a greater involvement in general gambling, which is in turn connected with problem gambling, but Winters and colleagues (1995) found that the Minnesota lottery switched adolescents from illegal to legal gambling and did not increase overall involvement in gambling in the state. The before-and-after study by Wallisch (1996) in Texas did not show consistent increases in the number of pathological gamblers.

Even when more pathological gamblers are concentrated in locations with more opportunities to gamble, the mechanisms behind this phenomenon are little understood. For example, legal gambling could increase the number of people who gamble at least a few times; if pathological gambling is some constant proportion of people who experiment with gambling, then the numbers of pathological gamblers will also increase. Another possibility is that legalization encourages people to gamble more frequently and to spend more money on gambling. This increased gambling activity could place more people at risk for developing gambling problems by increasing their comfort with games, their familiarity with gambling as entertainment, and their likelihood of socializing with other gamblers.

The spread of professional, legal gambling services (e.g., gambling offered by casino companies and government lottery agencies) over the past few decades has probably contributed to increases in public acceptance of gambling as recreation. It has been proposed that more middle-class parents consider gambling safe, family-oriented, and fun, and fewer worry about whether their teenagers gamble than they did in the past (Kearney et al., 1996). These attitude changes could encourage more adolescents to experiment with adult forms of gambling.

Because legalization typically increases the advertising of gambling and the openness of people's gambling behavior, the public is increasingly exposed to gambling behavior. Research on social influence shows that people's behavior typically conforms to that of others in the situation, particularly when the behavior is public and unambiguous (Cialdini, 1993). Adults, as well as children and teenagers, are influenced by their peers (Harris and Liebert, 1991). This conformity behavior occurs even in the presence of contradicting general values and prior learning. For example, children who are honest at home and have honest parents may cheat in school if their friends do. A reasonable hypothesis derived from this research is that, if people are exposed to settings in which people gamble, then behavioral norms (what most people in the situation actually do) will influence their gambling attitudes and behavior.

Exposure to gambling in others has been shown to be correlated with gambling or gambling problems. As discussed in earlier chapters, those who gamble as adults (especially illegally) report that they were exposed to gambling as children (Kallick et al., 1979; Downes et al., 1976). In the study by Kallick et al., people who made illegal bets reported three times the amount of childhood exposure to gambling than those who did not gamble. College students who played the lottery were more likely than those who did not to report that they had friends and parents who gambled. However, biases in retrospective memory seriously compromise these survey results. That is, even if everyone has the same exposure, people who gamble would be much more likely to think about others' gambling, to create cognitive associations with gambling, and to remember their parents' and friends' gambling activities. Pathological gamblers may be more likely to remember their parents as having gambled heavily than others would, even if there were no real differences between the two sets of parents. In effect, unless

retrospective surveys are very carefully designed and conducted, they cannot determine whether social influence through exposure plays a causal role in pathological gambling.

Another aspect of the social context of gambling that may influence people's propensity to develop problems with gambling is their practice of gambling in the company of friends or family. For instance, men who frequent the racetrack or who play poker together in the same group may develop (or reinforce) friendships around this activity. Many Americans used to invite one another to their homes for informal card games, sometimes limiting themselves to penny wagers. Elderly people and married women gambled with friends and family in bingo parlors or church basements; in some English communities, the bingo game was women's single opportunity to socialize outside the house (Dixey, 1987). Many large casinos today are attractive to elderly people because they can attend with friends or family. Racetracks, casinos, and card rooms often feature restaurants and other spaces where people can meet. In England and Europe, there are exclusive gambling clubs where people can socialize with others in their social circle.

Two opposing hypotheses seem reasonable. On one hand, it is possible that gambling with friends or family (compared with gambling alone or in the presence of strangers) is unlikely to result in excessive gambling, at least in the short run. Pleasurable social interaction increases positive feelings. Although positive feelings increase people's perceived probability of winning, it also reduces betting (Nygren et al., 1996), perhaps by increasing gamblers' happiness or reducing their boredom or loneliness. As well, social pressures from family and friends who are present may reduce gamblers' alcohol consumption or limit their expenditures. On the other hand, if friends and family gamble excessively, other members of these friendship and family groups could be led to do the same. Those who grow up in families in which family members gamble frequently, and those who have friends with gambling problems, could learn to use gambling as a response to stress, or perhaps to underestimate their gambling problems. In one study, problem gamblers were more likely than other gamblers to engage in team lottery play (Hraba and Lee, 1995).

EFFECTS OF CHANGING TECHNOLOGY

Americans seem to love technology and the products and services made possible by technology. In 1995, people over 18 spent about 3,400 hours watching TV and videos, listening to the radio and recorded music, playing home video games, and reading printed books, newspapers, and magazines (Sproull, 1998). Interaction with a home computer is fast approaching the popularity of these older technologies and activities. The first home computers were introduced as a hobbyist kit in 1975. Today, about 40 percent of all U.S. households own a personal computer; roughly a third of these homes have access to the Internet. Computer technologies in homes, offices, and public places combine and increase the functionality of older technologies, providing new ways to use information and to communicate with others. None of the major changes in the organization of computing and in computing technology was foreseen even halfway in the century--the rise of high-technology industries, the shifts in office employment from clerical to technical labor, the popularity of electronic mail, the adoption of home computers, and the phenomenal spread of the Internet (from 150 sites in 1993 to 2.45 million in 1997).

The organization and technology of gambling has changed no less dramatically and no less surprisingly in the past few decades. Some indicators of this change can be gleaned from analyses of gambling revenues and consumer spending. For example, in an analysis of the

demand for commercial gambling, Christiansen (1998, Table 2:41) listed sources of revenue from gambling in 1982 and 1996. In 1996 but not in 1982, revenues from the following types of gambling were sufficiently well measured (or noticeable) to be listed: intertrack wagering (horses), intertrack wagering (greyhounds), offtrack betting (greyhounds), video lotteries, cruise ship casinos, deepwater cruise ships, cruises-to-nowhere, other commercial casino gambling, noncasino devices, and Indian reservation Class II (e.g., bingo) and Class III (casino) gambling. During this period, consumer expenditures on gambling increased at an annual rate of 11.4 percent, comparable to the growth of cable TV, home computers, and the Internet. At the same time, a redistribution of revenue sources occurred across types of gambling. People spent less at the racetrack and on traditional table games and bingo, and more on casinos, lotteries, card rooms, and sports betting.

Changes in the marketing of gambling may alter the demographics of gambling and pathological gambling. Gambling enterprises have traditionally attracted new or repeat customers through a variety of mechanisms, such as easy credit, low prices of entry (nickel slots; \$1 lottery tickets), or “comps” and “freebies” (free games, food, or drinks; reduced hotel costs; shows and other entertainment for nongambling family members). As gambling has become more acceptable as a business investment (Eadington, 1982), popular marketing techniques have been applied to increase gambling sales and profits. Increasingly, businesses target particular market segments. For example, whereas racetracks traditionally attracted men and people who could or would take time off from work, casinos may offer baby-sitting facilities for parents and weekend package getaways for working people to reduce their effort and concerns about budget and time. Casinos also evaluate how to use floor space in relation to their market (Dandurand, 1990). For example, they may identify a market niche, such as elderly women who gamble \$2 slots, and design safe places for these women to put their purses. Lotteries may attract gamblers who are female, minority, low income, or elderly because they are practically effort-free and do not require risky social behaviors or large investments (Lorenz, 1990).

During the period when legalization and the open marketing of gambling opened large new markets to gambling, technical advances in computing and telecommunications made possible the creation of new automated gambling devices and services, better casino security and policing against cheating, development of remote gambling services, consolidated operations across states and venues, and better collection and use of market data from such information sources as credit ratings, Internet hits, and membership (club card) records. The rapidly growing high-technology gambling industry suggests that future advances in multimedia, digitization, satellites, and the like will lead to many future technological changes in gambling.

Technological change is evident even in the traditional horse racing industry. A decade ago, competition with other forms of legal gambling threatened the owners of horses, training facilities, and racetracks with slimmer profits as new forms of gambling gave customers new entertainment options. New technology in the form of satellite wagering facilities or “betting parlors,” simulcast races, and video poker machines that could run 48 hours a day may have saved some racetracks. Racetracks today offer new wagering options on chance-based games made possible by computers (e.g., picking the exact order of finishing or wagering that an even-numbered horse will win). New games such as picking the winner of six races can offer large payoffs with low probabilities of a win, approaches that increase profits and attract customers. Changes in computers and telecommunications are changing the way racing games are being distributed. Wagering on horse races is now available to many people without leaving their homes. The Internet offers hundreds of web sites where people can bet on a variety of sports,

including racing. A new effort by Television Video Games/On Demand Services joins television technology with racetrack products (Barrett, personal communication to the committee, 1998). It is not clear what effect these new gambling opportunities will have; for example, complexity in games can actually reduce risk-taking (Johnson and Bruce, 1997).

In evaluating the impact of technological change on pathological gambling, we cannot make predictions based on technical features alone (Shaffer, 1996). For instance, the telephone, TV, and the Internet are all technologies that have the potential to reduce the importance of physical distance as a constraint on gambling. They reduce the financial and behavior costs of getting information about gambling and increase people's gambling options. However, people could use both the telephone and the Internet, instead, to augment their traditional face-to-face communication for social contact. They could expand their number of friends and acquaintances and reduce the difficulty of coordinating interaction with them. Alternatively, because these technologies disproportionately reduce the costs of communication with geographically distant friends and acquaintances, they may lead to shifts in people's portfolios to more distant contacts. In addition, the Internet, through such things as interactive games and distribution lists, fosters communication among strangers. As a result, people who use these technologies heavily may have a smaller proportion of their total social contacts with family and close friends. Gambling via cable or satellite television and the Internet provides asocial entertainment and information that could compete with social contact as a way for people to spend their time.

Game Machines

Several writers have argued that playing computer-based game machines is more likely to lead to pathological gambling than other forms of gambling (e.g., Fisher and Griffiths, 1995; Fabian, 1995). Morgan and colleagues (1996) reported that video lottery gambling is the predominant type of gambling behavior engaged in by gamblers seeking treatment. Fisher and Griffiths (1995) argue that England's legal "fruit machines" (slots) are especially risky for adolescents. They claim that game machines, better than other technologies, can be designed and programmed to encourage frequent gambling. Gupta and Derevensky (1996) asked heavy and light video-game-playing children (ages 9-14) in Canada to complete a questionnaire and to play a computer blackjack game. The high-frequency video game players were more likely to report being regular gamblers. Heavy-playing boys also bet more on the blackjack tasks. The authors speculate that experience with video games, in which practice can improve performance, leads teenagers to have the illusion that gambling machine games are somehow solvable. Griffiths (1990) found that troubled teenagers (problem gamblers, those who had been charged with crimes) were likely to hang out in video arcades and to play fruit machines frequently. However, this study and others on the correlates of children's machine gambling is only suggestive of a causal link between playing game machines and pathological gambling, and reasonable alternative explanations exist. For example, background and personal factors leading British adolescents to get into trouble could also lead them to hang out in arcades, play slots, and also to have illusions of skill in their gambling and other areas of their lives.

If new game machines such as video poker machines can be tailored to their users, they might be able to deliver more effective reward contingencies. Such an effect could increase the probability of problem gambling. Kilby (1987) discussed an older rating system for casino players whereby records were kept of frequent patrons' conversions of currency to chips. Those who cashed in more money might be given more "comps" such as free food, drinks, or games.

Today, plastic club cards used with game machines are a far more sophisticated version of the old system; they can record exactly how much a gambler is wagering on which types of games. In theory, these cards can track gambler preferences, wagers, and outcomes; future rewards and games can be “personalized” to those patterns (Popkin and Hetter, 1994). The cards also can be used to tally frequent gambler credits, encouraging loyalty to the casino or other venue.

Telecommunications technology also could be used in tailoring gambling to customer preferences and responses. Current gambling sites on the Internet require customers to provide their name, postal address, email address, social security number, and credit card information. Some sites require customers also to provide the name of the customer’s mother’s maiden name or other specific identifying information. Typically software has to be downloaded to the customer’s machine as well; the customer’s machine has a unique address that allows records to be kept over time about the use of that machine. Software can record gamblers’ identity when they start a gambling session and passively log the time they spend gambling, the game they play, the time they spend logged into the Internet, the address that identifies the web pages they connect to, and in some cases the electronic mail addresses they exchange email with. Although current Internet gambling sites are fairly traditional in their design and have problems with slow response time and errors, the technology provides opportunity for much more sophisticated, adaptive applications in the future.

Home Gambling

Many scholars, technologists, and social critics debate how computer technologies, and the Internet in particular, are transforming economic and social life (e.g., Anderson et al., 1995). It has been posited that home gambling and the Internet may attract adolescent gamblers, or cause people to get addicted to gambling and cut themselves off from normal social constraints on gambling, as they hunker alone over their terminals playing games in electronic casinos or betting with anonymous strangers through chat rooms. However, it could also be argued that gambling problems at home, whether via the Internet or some other telecommunications technology, will be rare. It has been claimed that the Internet actually offers people more and better entertainment and social opportunities by freeing them from the constraints of geography or isolation brought on by stigma, illness, or schedule (e.g., Rheingold, 1993).

There are at least two reasons why computer-based gambling at home should be studied further, using methodologies that can distinguish the effects of gambling at home from other factors. One reason is that gambling at home may increase people’s susceptibility to pathological gambling through the ease and frequency with which they can gamble. Another reason is that gambling at home may contribute to other personal problems. In particular, gambling at home is likely to increase passive leisure activity and solo gambling, and it may displace time spent on active, social interaction (including social gambling excursions with others and table games at home).

Computer-based gambling at home may have effects similar to those of watching television. Empirical work suggests that television-watching reduces social interaction (Jackson-Beeck and Robinson, 1981; Neuman, 1991; Maccoby, 1951). At the individual level, social disengagement is associated with poor quality of life and diminished physical and psychological health. Time studies show that social interactions are among the most pleasant experiences people have (Robinson and Godbey, 1997). People who have close ties with local friends, neighbors, and family have available to them social support that seems to buffer them from life

stresses (Cohen and Wills, 1985). One study also shows that the social support that people get from distant acquaintances, friends, and family is less effective in buffering daily stress than the support they get from their local friends and neighbors (Wellman and Wortley, 1990).

Compared with people who have little social contact in their lives, people with more social contact are physically healthier, mentally healthier, and happier (e.g., Cohen and Wills, 1985).

Gambling at home also may encourage passive, sedentary activity, as watching television does. Recent epidemiological research has linked television-watching with reduced physical activity and diminished physical and mental health (Andersen et al., 1998; Sidney et al., 1998). Gambling by adolescents is correlated with watching television and other passive leisure-time activities (Junger and Wiegersma, 1995).

CONCLUSIONS

Computers and telecommunications are changing the gambling industry, individuals' opportunities to gamble, and the social context of gambling. The effects of these technologies, especially of home gambling and the Internet, are highly uncertain. Putnam (1995) and Condry (1993) have pointed to the television as a technology that has caused Americans to withdraw from personal and civic relationships, to the detriment of the television watchers themselves and the community as a whole. However, even for the case of television, which has been around for years, we have only a weak causal chain, suggesting that television viewing reduces social involvement or activity which in turn reduces physical and psychological health. The chain for the case of gambling machines and home gambling is even weaker. Studies of the prevalence of pathological or problem gambling for different types of gambling do not generally control for extraneous factors, including survey questions, locale, and year in which the survey was done. Computer-based video machine gambling is new enough that it is not well represented even in the modest number of surveys that address the issue. Hence the impact of technology remains an important but open question. We do not know whether problem gamblers are more attracted to video or machine gambling than gamblers without problems, and we do not understand the mechanisms that account for the associations reported in the literature.

Research is needed that allows us to better understand the link between use of gambling technologies and subsequent changes in gambling disorders. By conducting natural experiments and prospective studies, preferably with national samples, it would be possible to estimate the extent to which conclusions from correlational cross-sectional studies are valid or widespread and to determine some of their limiting conditions. By differentiating social and asocial types of gambling, and by employing careful measures such as time diaries and assessments of the size and type of social circles that gamblers maintain, researchers would be able to test several of the plausible mechanisms by which use of technology may change vulnerability to pathological gambling.

Research on the organization and technology of gambling should be evaluated in the context of the sparse research on social and technological change more generally. Little empirical research exists even about the social effects of such important technologies as the television and the telephone. Laboratory studies on technology in gambling have tended to focus on the structure of gambles rather than gambling habits and social outcomes. These studies have led to important theories about the nature of betting, but their implications for technology and gambling problems have not been tested. Few if any gambling organizations would be willing to run public experiments on these issues, and even if they did, the link to pathological gambling

would be difficult to trace. Field research on the organization and technology of gambling is rare, although there is a body of literature on the effects of legalization, most of which relies on cross-sectional surveys and self-reports of gambling behaviors. Since legalization is likely to change reporting along with the technology, markets, attitudes, and constraints of gambling, it is hard to draw conclusions about how a particular aspect of legalization is affecting people.

One way to study the effects of new technology or organization in natural settings is through natural experiments; natural experiments elicit data to which time series analyses can be applied (see Lyons and Ghezzi, 1995). Another approach would be to conduct prospective, longitudinal studies of individuals. This approach has long been used in studies of health and disease (e.g., the Framingham heart study). However, it is possible that little is to be gained from a dedicated longitudinal prospective study of pathological gambling, since only a tiny percentage of the sample is likely to develop a gambling problem. Still, it would seem feasible and worthwhile to add measures of gambling and related leisure activities and outcomes (e.g., debts) to other prospective longitudinal studies in health or mental health. Doing so would not only add valuable information about gambling over time, but also would provide important information about baseline data and comorbidity.

Even prospective studies can pose threats to valid causal claims. First, statistical controls may not adequately equate groups (e.g., gamblers and nongamblers) on other factors. Preexisting factors (ranging from cohort characteristics to biological stress) could cause people to be predisposed to gambling and as well to be attracted to a particular type of game or gambling setting. Second, unmeasured variables that change over time may induce both gambling of certain types and changes in outcomes such as problem gambling. Measuring gambling in relationship to how people spend their time and money more generally might be useful in understanding other factors that may be related to both normal, social gambling and problem gambling. Detailed studies using time and expenditure measures; measures of social network size, social activities, and stress; psychological measures of social support and physical and mental health could contribute to understanding of the relationships between problem gambling, how people use technology, time, and money, social interaction, and the size of social networks.

REFERENCES

- Anderson A., Van Der Heijden, H.
1998 Media, culture, and the environment. *Environmental Politics* v. 7 no. 4 p. 188-189.
- Chantal, Y., R.J. Vallerand, And E.F. Vallieres
1995 Motivation And Gambling Involvement. *Journal Of Social Psychology* 135(6): 755-763.
- Chau, A.W., and J.G. Phillips
1995 Effects of perceived control upon wagering and attributions in computer blackjack. *The Journal of General Psychology* 122.
- Chavetz, H., and C. Simon
1967 *Play the devil: A history of gambling in the United States*. New York, NY: C. N. Potter.
- Christiansen, E.M.
1998 A new entitlement. *International Gaming and Wagering Business*.
- Cialdini, R.B.
1993 *Influence: Science and practice* (3rd ed.) N.Y.: Harper Collins College Publishers.
- Clotfelter, C.T., and P.J. Cook
1989 *Selling hope: State lotteries in America*. Harvard University Press: Cambridge, MA.
- Coate, D., and G. Ross
1974 The effect of off-track betting in New York City on revenues to the city and state governments. *National Tax Journal* 27:63-69.
- Cohen, J. And E.I. Chesnick
1970 The Doctrine Of Psychological Chances. *British Journal Of Psychology* 61(3): 323-334.
- Cohen, J., L.E. Boyle, and A.P.W. Shubsachs
1969 Rouge et noir: Influence of previous play on choice of binary event outcome and size of stake in a gambling situation. *Acta Psychologica* 31:340-352.
- Cohen, S. And T.A. Wills
1985 Stress, Social Support, And The Buffering Hypothesis. *Psychological Bulletin* 98(2): 310-357.
- Cohen, J. and E.I. Chesnick
1970 The doctrine of psychological chances. *British Journal of Psychology* 61:323-334.
- Cole, W.R., and R. Hastie
1978 The effects of lottery game structure and format on subjective probability and attractiveness of gambles. *Personality-and-Social-Psychology-Bulletin*. 1978 Oct Vol 4(4):608-611.

- Condry, J.
1993 Thief Of Time, Unfaithful Servant: Television And The American Child. *Daedalus* 122(1): 249-278.
- Cook, C.T. and P.J. Clotfelter
1993 The peculiar scale economies of lotto. *American Economic Review* 83(3): 634-633.
- Cox, S., H.R. Lesieur, R.J. Rosenthal, and R.A. Volberg
1997 Problem and Pathological Gambling in America: The National Picture. Columbia, MD: National Council on Problem Gambling.
- Dandurand, L.
1990 Market niche analysis in the casino gaming industry. *Journal of Gambling Studies* 6:73-85.
- Dixey, R.
1987 It's a great feeling when you win: Women and bingo. *Leisure-Studies*. May Vol 6(2):199-214.
- Downes, D.M., B. Davies, And M.E. David
1976 Gambling, Work And Leisure: A Study Across Three Areas. London: Routledge And Kegan.
- Eadington, W.R.
1982 Studies in the business of gambling. Reno, Nevada: Bureau of Business and Economic Research, University of Nevada-Reno.
- Emerson, M.O., and J.C. Laundergan
1996 Gambling and problem gambling among adult Minnesotans: Changes 1990 to 1994. *Journal of Gambling Studies* 12(3):291-304.
- Fabian, T.
1995 Pathological Gambling: A Comparison Of Gambling At German-Style Slot Machines And "Classical" Gambling. *Journal Of Gambling Studies* 11(3): 249-263.
- Fabian, A.
1990 Card sharps, dream books, and bucket shops: Gambling in 19th-century America. Ithaca and London: Cornell University Press.
- Fischhoff, B., S. Lichtenstein, P. Slovic, S.L. Derby, and R. Keeney
1981 Acceptable risk. Cambridge, New York.
- Fisher, S.E.
1994 Identifying video game addiction in children and adolescents. *Addictive-Behaviors* 19 (5):545-553.
- Fisher, S.E., and M. Griffiths
1995 Current trends in slot machine gambling: Research and policy issues. Special Issue: Slot machine gambling. *Journal of Gambling Studies* 11(3):239-247.
- Gilovich, T.
1983 Biased evaluation and persistence in gambling. *Journal of Personality and Social Psychology* 44:1110-1126.
- Gilovich, T., R. Vallone, and A. Tversky
1985 The hot hand in basketball: On the misperception of random sequences. *Cognitive Psychology* 17:295-314.
- Gopher, D. and E. Donchin

- 1986 Workload-An examination of the concept. In Handbook of Perception and Human Performance, K.R. Boff, L. Kaufman, and J. P. Thomas, eds., (pp. 41-1 - 41-48). New York: John Wiley.
- Griffiths, M.D.
- 1998 Gambling technologies: Lessons from scholarly literature and prospects for pathological gambling. Presentation to the National Research Council Committee on the Social and Economic Impact of Pathological Gambling. Washington, D.C: September 2.
- Griffiths, M.D.
- 1995 Technological addictions. Clinical Psychology Forum, 76, 14-19.
- Griffiths, M.D.
- 1994 The role of cognitive bias and skill in fruit machine gambling. British Journal of Psychology 85:351-369.
- Griffiths, M.D.
- 1993 Fruit machine gambling: The importance of structural characteristics. Journal of Gambling Studies 9:133-152.
- Griffiths, M.D.
- 1990 The acquisition, development, and maintenance of fruit machine gambling in adolescents. Journal of Gambling Studies 6(3):193-204.
- Griffith, R.M.
- 1949 Odds adjustment by American horse-race bettors. American Journal of Psychology 62:290-294.
- Gupta, R. and J.L. Derevensky
- 1996 The relationship between gambling and video-game playing behavior in children and adolescents. Journal of Gambling Studies 12(4): 375-394.
- Harris, J.R., and R.M. Liebert
- 1991 The child: A contemporary view of development (3rd ed.). Englewood Cliffs, NJ, USA: Prentice-Hall, Inc.
- Henslin, J.M.
- 1967 Craps and magic. *American Journal of Sociology* 73:316-330.
- Herrnstein, R.
- 1990 American Psychologist (45) p.356.
- Hirsch, A.R.
- 1995 Effects of ambient odors on slot-machine usage in a Las Vegas casino. Psychology and Marketing 12(7): 585-594.
- Hraba, J. and G. Lee
- 1995 Problem gambling and policy advice: The mutability and relative effects of structural, associational and attitudinal variables. Journal of Gambling Studies 11(2): 105-121.
- Hraba J., Mok, W., and Huff, D.
- 1990 Lottery play and problem gambling. Journal of Gambling Studies, v.6 pp.355-377.

- Huber, O., R. Wider, and O.W. Huber
 1997 Active information search and complete information presentation in naturalistic risky decision tasks. *Acta Psychologica* 95(1): 15-29.
- Hybels, J.H.
 1979 The impact of legalization on illegal gambling participation. *Journal of Social Issues* 35(3): 27-35.
- Jackson-Beeck, M. and J.P. Robinson
 1981 Television nonviewers: An endangered species? *Journal of Consumer Research* 7(4): 356-359.
- Johnson, J.E.V. and A.C. Bruce
 1997 A profit model for estimating the effect of complexity on risk taking. *Psychological Reports* 80(3 Pt 1): 763-772.
- Junger, M., and A. Wiegiersma
 1995 The relations between accidents, deviance and leisure time. *Criminal-Behaviour-and-Mental-Health* 1995 Vol 5(3):144-174.
- Kahneman, D., and A. Tversky
 1979 Prospect theory: An analysis of decision under risk. *Econometrica* 47:263-291.
- Kallick, M., D. Suits, T. Dielman, and J. Hybels
 1979 Ann Arbor, MI: Survey Research Center, Institute for Social Research, University of Michigan Press.
- Kaplan, H.
 1984 American Academy of Political and Social Science, *Annals*, vol. 474, p. 81. July.
- Katz, J.E. and P. Aspden
 1997 A nation of strangers? *Communications of the ACM* 40(12): 81-86.
- Kearney, C.A., T. Roblek, J. Thurman, and P.D. Turnbough
 1996 Casino gambling in private school and adjudicated youngsters: A survey of practices and related variables. *Journal of Gambling Studies* 12(3):319-327.
- Keren, G. And C. Lewis
 1994 The Two Fallacies Of Gamblers: Type 1 And Type II. *Organizational Behavior And Human Decision Processes* 60(1): 75-89.
- Keren, G. And W.A. Wagenaar
 1985 On The Psychology Of Playing Blackjack: Normative And Descriptive Considerations With Implications For Theory. *Journal Of Experimental Psychology General* 114(2): 133-158.
- Kiesler, S., L. Sproull, and J. Eccles
 1985 Poolhalls, chips, and war games: Women in the culture of computing. *Psychology of Women Quarterly* 9:451-462.
- Kilby, J.
 1987 Casinos and good players: The ideal rating system. Paper presented to The Seventh Conference on Gambling and Risk Taking, August 23, Reno, NV.
- Knapp, T.J.
 1976 A functional analysis of gambling behavior. In *Gambling and Society*. Springfield, IL: Thomas.

- Kranes, D.
1995 Play Grounds. Special Issue: Gambling: Philosophy And Policy. *Journal Of Gambling Studies* 11(1): 91-102.
- Lacey, O.L., and J.L. Pate
1960 An empirical study of game theory. *Psychological Reports* 7:527-530.
- Ladouceur, R., I. Giroux, And C. Jacques
1998 Winning On The Horses: How Much Strategy And Knowledge Are Needed? *Journal Of Psychology* 132(2): 133-142.
- Ladouceur, R. and D. Dube
1997 Monetary incentive and erroneous perceptions in American roulette. *Psychology: A Journal of Human Behavior* 34(3-4): 27-32.
- Ladouceur, R., D. Dube, I. Giroux, and N. Legendre et al.
1995 Cognitive biases in gambling: American roulette and 6/49 lottery. *Journal-of-Social-Behavior-and-Personality*. 1995 Jun Vol 10(2):473-479.
- Ladouceur, R. and A. Gaboury
1988 Effects of limited and unlimited stakes on gambling behavior. *Journal of Gambling Behavior* 4:119-126.
- Ladouceur, R. and M. Mayrand
1986 Psychological characteristics of monetary risk-taking by gamblers and non-gamblers in roulette. *International Journal of Psychology* 21(4-5): 433-443.
- Langer, E.J.
1975 The illusion of control. *Journal of Personality and Social Psychology* 32:311-328.
- Lesieur, H.R., and J.F. Sheley
1987 Illegal appended enterprises: Selling the lines. *Social Problems* 34:249-260.
- Lorenz, V.C.
1990 State lotteries and compulsive gambling. *Journal of Gambling Studies*, v.6, no. 4, pp. 383-396.
- Lupfer, M., and M. Jones
1971 Risk taking as a function of skill and chance orientations. *Psychological Reports* 28:27-33.
- Lyons, C.A. and P.M. Ghezzi
1995 Wagering on a large scale: Relationships between public gambling and game manipulations in two state lotteries. *Journal of Applied Behavior Analysis* 28(2): 127-137.
- Maccoby, E.E.
1951 Television: Its Impact On School Children. *Public Opinion Quarterly* 15:421-444.
- McDonald, J.
1976 How horseplayers got involved in the urban crisis. In *An economic analysis of crime*, L.J. Kaplan and D. Kessler, eds. Springfield, IL: Thomas.
- Metzger, M.A.
1985 Biases in betting: An application of laboratory findings. *Psychological-Reports*. 1985 June Vol 56(3):883-888.

- Michael, J.
1993 *Pot Of Gold. A Novel.* New York: Poseidon Press.
- Mikesell, J.L. and C.K. Zorn
1987 State lottery sales: Separating the influence of markets and game structure. *Growth and Change* 18:10-19.
- Moran, E.
1970 Varieties of pathological gambling. *British Journal of Psychiatry* 116:593-597.
- Morgan, T., L. Kofoed, J. Buchkoski, And R.D. Carr
1996 Video Lottery Gambling: Effects On Pathological Gamblers Seeking Treatment In South Dakota. *Journal Of Gambling Studies* 12(4): 451-460.
- Myers, J.L., and J.G. Fort
1963 A sequential analysis of gambling behavior. *The Journal of General Psychology* 69:299-309.
- Neuman, S.B.
1991 *Literacy In The Television Age: The Myth Of The Tv Effect.* Norwood, Nj: Ablex Publishing Corporation.
- Nygren, T.E., A.M. Isen, P.J. Taylor, and J. Dulin
1996 The influence of positive affect on the decision rule in risk situations: Focus on outcome (and especially avoidance of loss) rather than probability. *Organizational-Behavior-and-Human-Decision-Processes*. 1996 Apr Vol 66(1):59-72.
- Oster, S.L. And T.J. Knapp
1998 Sports Betting By College Students: Who Bets And How Often? *College Student Journal* 32(2): 289-292.
- Phillips, J.G., and P.C. Amrhein
1989 Factors influencing wagers in simulated Blackjack. *Journal-of-Gambling-Behavior*. 1989 Sum Vol 5(2):99-111.
- Popkin, J., and K. Hetter
1994 America's gambling craze. *US News and World Report* pp. 42-43,46,48-56.
- Putnam, R.
1995 Tuning in, tuning out: The Strange disappearance of social capital in America. "Public Speeches", vol. 28, December 95, pp. 664-83.
- Rachlin, H.
1990 Why do people gamble and keep gambling despite heavy losses? *Psychological Science* 1(5):294-297.
- Rachlin, H.
1989 *Judgement, decision, and choice.* W.H. Freeman (publisher). U.S.
- Rheingold, H.
1993 *The Virtual Community: Homesteading On The Electronic Frontier.* Reading, Ma: Addison-Wesley Publishing Company.
- Robinson, J.P. and G. Godbey
1997 *Time for life: The surprising ways Americans use their time.* University Park, PA: Pennsylvania State University Press.
- Rose, I.N.
1998 Technology and the future of gambling. (Unpublished manuscript).

- Rose, I.N.
1995 Gambling and the law: Endless fields of dreams. *Journal of Gambling Studies* 11:15-33.
- Rosecrance, J.
1986 Adapting to failure: The case of horse race gamblers. *Journal of Gambling Behavior* 2(2): 81-94.
- Rule, B.G., and D.G. Fischer
1970 Impulsivity, subjective probability, cardiac response, and risk-taking: Correlates and factors. *Personality* 1:251-260.
- Shaffer, H.J.
1996 Understanding the means and objects of addiction: Technology, the Internet, and gambling. *Journal of Gambling Studies* 12(4):461-469.
- Skea, W.H.
1995 "Postmodern" Las Vegas and its effects on gambling. *Journal of Gambling Studies* 11(2): 231-235.
- Skinner, B.F.
1953 Science and human behavior. New York: MacMillan OR Appleton Century Crofts???
- Skolnick, J.
1978 House of cards: Legalization and control of casino gambling. Boston: Little Brown.
- Sproull, 1998 7-16
- Thaler, R.H. and E.J. Johnson
1990 Gambling with the house money and trying to break even: The effects of prior outcomes on risky choice. *Management Science* 36:643-660.
- Thalheimer, R. And M.M. Ali
1992 Demand For Paramutual Horse Race Wagering With Special Reference To Telephone Betting. *Applied Economics* 24(1): 137-142.
- Thompson, D.
1986 Nevada: A history of change. Reno, Nevada: Danberg Foundation.
- Tversky And Gilovich
1985 The hot hand in basketball: On the misperception of random sequences. *Cognitive Psychology* v.17, p. 295-314.
- Tversky A., and D. Kahneman
1992 Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, 5 .
- Varey, C., Mellers, B., and Birnbaum, M.
1990 Judgements of proportions. *Journal of Experimental Psychology*, v. 16, p. 613-625
- Volberg, R.A.
1994 The prevalence and demographics of pathological gamblers: Implications for public health. *American Journal of Public Health* 84:237-241.

Waerneryd, K.E.

1996 Risk attitudes and risky behavior. *Journal of Economic Psychology* 17(6): 749-770.

Wagenaar, W.

1988 Paradoxes of gambling behavior. *The American Journal of Psychology*. V. 103, p. 290-297.

Wagenaar W.

1972 Generation of random sequences by human subjects: A critical survey of the literature. *Psychological Bulletin* 77:65-72.

Wallisch, L.S.

1996 Austin, TX: Texas Commission on Alcohol and Drug Abuse.

Wellman, B. and Wortley, S.

1990 Different strokes from different folks: Community ties and social support. *American Journal of Sociology*, v.96, p. 558-88.

Wellman, B. And S. Wortley

1990 Brothers' Keepers: Situating Kinship Relations In Broader Networks Of Social Support. *Sociological Perspectives* 32(3): 273-306.

Wellman, B and S. Wortley

1990 Different strokes from different folks: Community ties and social support. *American Journal of Sociology* 96(3): 558-588.

Winters, K.C., R.D. Stinchfield, and L.G. Kim

1995 Monitoring adolescent and gambling in Minnesota. *Journal of Gambling Studies* 11:165-183.

ZURCHER, L.A.

1970 The 'friendly' poker game: a study of an ephemeral role. *Social forces* 49(2): 173-185.